



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: <b>PCT/SE96/01727</b> (22) International Filing Date: <b>20 December 1996 (20.12.96)</b> (30) Priority Data: <b>9504638-9</b>      <b>22 December 1995 (22.12.95)</b>      <b>SE</b> (71) Applicant (for all designated States except US): <b>PRICER AB (SE/SE); Kristallen, S-754 51 Uppsala (SE).</b> (72) Inventor; and (75) Inventor/Applicant (for US only): <b>ÖDMARK, Ota (SE/SE); Ullsaxvägen 5, S-756 48 Uppsala (SE).</b> (74) Agents: <b>MRAZEK, Werner et al.; Dr. Ludwig Brann Patentbyrå AB, P.O. Box 1344, S-751 43 Uppsala (SE).</b></p>		<p>(81) Designated States: <b>AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TO).</b>  <b>Published</b> <i>With international search report. In English translation (filed in Swedish).</i></p>
<p>(54) Title: <b>METHOD AND DEVICE FOR LCD-LABEL</b></p> <div data-bbox="401 1079 1373 1535"> </div> <p>(57) Abstract</p> <p>The invention discloses an electronic price and information display, the color of which for the background and/or displayed symbols may be changed by means of additionally arranged filters, which are arranged to be rotated 90° on top of the basic filter, to thereby change the color of the background and/or the symbols. The price and information displays being arranged with additional filters, according to the invention, may constitute LCD screens of either reflexive, transmissive or transreflexive type.</p>		

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METHOD AND DEVICE FOR LCD-LABEL  
Technical field

The present invention relates to a method and a device for electronic price and information labels, and more particularly to an electronic price label of type LCD to create different colored fields and symbols thereon.

Background art

Within retailing the discussions regarding systems for automatic price marking has worldwide been going on for half a decade. More than twenty companies, known by us, have been working on different solutions of the problems. Initially the motives primarily were saving of labor and amount of possible time gain, which then did define a realistic investment level for such a system.

Parallel to this process retailing has invested in shop computers connected to commodity readers which register the identity of the article by means of a so called EAN code and automatically looks for the price of the article in a corresponding data base. This system has led to individual price marking of articles being replaced with shelf edge labels and other signs which, to a customer give a name and price of an article, thus meaning that the price labels, which otherwise stick to each article, can be omitted.

Electronic shelf edge labels and signs being controlled from the same shop computer, or in other words from the same data base, will guarantee that the price presented in connection with the article, and the price charged the customer at the cashier, should always be identical. This possibility has resulted in that authorities worldwide are raising demands that the price stated in connection with the article and the price charged at the cashier should be identical and a federal statute in the U.S.A. now calls for an agreement of 98%.

The earliest systems for electronic price marking were based on cable wired labels, but nowadays being more often replaced by

autonomous operating wireless units. This development is considered being entirely necessary, both relating to reliability as well as complexity in installation and conversion.

An autonomous operating unit has a definite limited supply of energy, independent of being based on only a battery or a solar cell as energy source, or any combination of these energy sources, and furthermore low current presentation displays or signs of type liquid crystal displays, LCD:s, are used, which nowadays almost exclusively are utilized for displaying prices in connection with electronic devices.

A producer of commodities trying to win a greater share of the market for his articles, or a tradesman wanting to increase the rate of turnover for certain articles, often uses the price as interesting means for a current selection, for instance, in form of a so called special offer. Such prices were earlier marked by red labels to alert interest.

A conventional LCD has a very limited possibility to attract particular attention. Other available technical solutions have the negative characteristic that they consume too much energy, normally more than what is available.

Instead the result is that an otherwise fully automatic system is provided with manual signs which shall attract interest of the article of occasionally changed price. In a shop this may be including several thousand articles a week which should be provided with new signs and several thousand signs to be removed.

The time saving sought would be lost and the safety in pricing would also be lost due to the time period between changing data in the database and putting up or bringing down signs and dependent on errors caused by the human factor.

For example, LCD technique utilized in connection with shelf edge labels based on liquid crystals twisting the light, the light

first passing a polarizing filter, the crystals will either be experienced as opaque or will block the light and be experienced as black. The liquid crystals may be influenced by means of pulsating electrical fields of force and an opaque crystal will thereby be changed to be black and vice versa, which in LCD technique may be utilized for in a controlled manner accomplish figure or symbol segments.

According to the state of the art it is known by combining the polarization filter with filtering of selected frequencies, segments of red, blue or green may be achieved instead of segment of black. The problem is that this technique has no greater value as the display will still be monochrome, i.e. either the information is always black or any other selected color, while the desire is to be able to change color for articles having a reduced price.

Consequently there is a desire in a simple way to be able to change color of the background and/or symbols in connection with such an electronic price and information sign.

#### Disclosure of the invention

By providing a LCD with several different variable combinations of filters, portions of the information, e.g. price, may always be black, while another portion, e.g. a text "REDUCED PRICE", always is red. When the text flickers in red color, attention is attracted to the changed price, which is still black and if the article has normal price no red field will be activated.

Color and polarization filters may then be combined in a number of ways and a filter being rotated 90 degrees gives an inverted image. The filters may cover different portions of the display or being overlaid each other to in such a way present, e.g. red figures with blue or black background.

Price display may be delivered with separate filters so that the shopkeeper himself easily should be able to alter his displays

as needed.

A LCD sign being provided with a red basic filter and a blue filter mounted on top gives, with a transmissive background, black segments. If the blue filter is rotated 90 degrees, red figures to a blue background are obtained. By mounting the blue filter onto a rotation means the color change can be remotely controlled either direct or via signals transferred wireless

#### Brief Description of the Drawings

The invention will be described in form of preferred illustrative embodiments by means of the attached drawings, in which like reference numbers define same or corresponding elements and wherein:

- Fig. 1 illustrates a LCD sign provided with two different fields having different combinations of polarization filters, according to the present invention, to accomplish areas presenting different colors;
- Fig. 2 illustrates the principle of changing the color of symbols, for instance, from red to black, by removing one of the polarization filters at one field of the LCD sign according to Fig. 1;
- Fig. 3 illustrates the principle, by moving and rotating a polarization filter 90°, changing both the background color and symbol color for different portions of the LCD sign; and
- Fig. 4 illustrates in an illustrative embodiment a sign which, according to the invention, comprises a filter which is rotated in front of the sign by means of a rotating means.

#### Description of an exemplifying embodiment

Figure 1 illustrates a price marking sign having so called LCD (Liquid Crystal Display) technique. Such signs are found in

different sizes, e.g. in department stores, either as electronic shelf edge labels or as larger signs for price and article information. In the most frequent LCD:s, e.g. digital watches and similar applications, a number of symbols are presented in black on a usually light grey background. The basic function of a LCD screen is founded on a polarizing basic filter in front of the liquid crystals. The LCD screen uses either light from the front being reflected at its rear surface, i.e. a reflexive function or light being generated behind the screen and shining through, i.e. a transmissive technique. Also a function referred to as transreflexive, being a combination of reflexive and transmissive techniques, may be a possible choice. Due to the basic filter being a polarizing filter, only light having a corresponding polarization can pass the filter. In other words, when the areas of liquid crystals electrically are biased by a suitable voltage the alignment of the crystals may be changed such that these areas also in turn may act as a polarizer with a polarization plane perpendicular to the polarization plane of the basic filter. This implies that no light can be reflected and be passing through areas where the liquid crystals are activated in the given direction of polarization which no longer agrees with the polarization plane of the basic filter. These areas then will stand out black against the lighter background.

If a color filtering polarizing film is used instead of the normal basic filter the areas which otherwise are obtained black will instead be obtained in a certain color, for instance red, blue or green. A color polarizing film which may be used for this purpose, for instance, for the colors red, green and blue is manufactured among others by the company Nitto Denko Corporation in Japan. The basic purpose of these filter has been primarily to try to further improve the contrast of LCD screens by means of these. Nitto Denko Corporation offers such polarizing film of either reflexive, transmissive or transreflexive type.

In Figures 1 and 2 a display 10 is presented, which is divided into two basic fields 10 and 15. The field 10 with a basic filter

of standard type contains a number of segments of liquid crystals, for instance seven, whereby in a known manner with a suitable combination of segments the numbers 0 to 9 may be generated. In figure 1 is shown the field 10 having all segments activated whereby a number of figure symbols "8", 12a, 12b, 12c, 12d and 12e appear in black against a light background. Additionally in the display 1 there are two decimal points 14a and 14b. In a corresponding manner there is at the top of field 15 a text symbol 13 "NEDSATT PRIS" (REDUCED PRICE), which may be displayed by activating the liquid crystals representing this text symbol.

In front of the field 15 in Figure 1 there is arranged an additional polarization filter 16, for example, of a type described previously, through which the text symbol then is made to be displayed, for instance, in red color. Figure 2 demonstrates that, if the additional polarization filter 16 partly is removed, the portion of the text symbol still being covered by the filter 16 will be displayed, for instance, in red color while the portion of the text symbol no longer being covered by the filter 16 will not be displayed, even if it is activated.

Figure 3 shows for reasons of illustration two juxtaposed LCD:s 1a and 1b of a corresponding type as those of Figures 1 and 2, but with, for instance, a red basic filter. The left display 1a is presented with an additional filter 16 which in principle covers the entire display, which then will, for instance, display both the text symbol 13 and the numbers 12a-12e and the decimal points 14a-14b in black color.

At the right display 1b of Figure 3 the filter 16 is shown rotated 90° and positioned over the left portion of the display 1b, whereby this portion now being covered by the filter 16 will display the text symbol 13 in red color, but now against a blue background, while the right portion of the display 1b now not being covered by the filter 16 will display the numbers, no longer covered by the filter 16, in red color against the normally light background. A small portion of the number 12a will



be red against a blue background.

In Figure 4 is further shown in an exemplifying embodiment two LCD:s 1c and 1d provided with a rotary filter 18 being made with three sectors each comprising 90° of a circular disc. In this case the disc is made such that the three existing sectors are made of same filter material and having a uniform polarization. For reasons of demonstration the fourth sector has been omitted to more simply be able to illustrate the turning position at the two respective displays 1c and 1d. A person skilled in the art will of course realize that in another embodiment it is of course possible to let each sector have a different filter characteristic and a different polarization relative to the other sectors, whereby also the center point of the disc may be positioned differently. The right display 1d and the left display 1c in this embodiment are provided with a basic filter which, for instance, makes the text symbol to be displayed in red color when it is activated.

At the left display 1c of Figure 4 the disc 18 is rotated with a direction of polarization such that numbers 12a, 12b, 12c, 12d, and 12e and decimal points 14a and 14b stand out in black against a light background while at the right display 1d the disc 18 is rotated such that its direction of polarization has been changed 90°, whereby, for instance, the portion of the background lying behind the filter 18 will be presented in black, while the numbers 12b, 12c, 12d and 12e, as well as the decimal points 14a and 14b now appear in red color.

In the illustrative embodiment the disc 18 is rotated by means of a rotation device, by which the disc can be positioned in different positions of polarization. The rotation device may be a stepping motor or a corresponding device which simply can be controlled electrically. In a preferred embodiment this turning of the disc 18 takes place by remote control, either via wire or wireless, for example by means of IR light in a manner well known for a person skilled in the art.

The price and information displays being disclosed in Figures 1 - 4 may consist of LCD:s either of reflexive, transmissive or transreflexive type.

The price and information display according to the present invention may of course be modified by a person skilled in the art and be made in numerous ways by different combinations of filters without departing from the spirit and scope of the invention, which is defined by the attached claims.

## CLAIMS

1. A method to control colors in connection with an electronic price and information display comprising a LCD screen, characterized by

arranging a number of polarization filters at the LCD screen (1), which filters then may form a multiplicity of combinations and whereby a first polarization filter of a set of a multiplicity of color filtering polarization filters constitute a basic filter; and

combining said basic filter with at least an additional polarization filter (16, 18) of said set of a multiplicity of color filtering polarization filters to achieve a given color for a background (10, 15) of the LCD screen (1) and/or symbols (12a-12e, 13, 14a, 14b).

2. The method according to claim 1, characterized by the step of rotating primarily the additional polarization filter (16, 18) to thereby change color of the background (10, 15) of the LCD screen and/or symbols (12a-12e, 13, 14a, 14b).

3. The method according to claim 2, characterized in arranging different basic filters (16, 18) to cover different portions (10, 15) of the LCD screen (1) to thereby form different fields (10, 15) having different color characteristics.

4. The method according to claim 3, characterized in that a polarization filter (18) being combined with the basic filter is made rotatable 90° by means of a driving device arranged at the price display for rotating said polarization filter.

5. The method according to claim 4, characterized in utilizing a transmissive technique for the price and information display comprising the LCD screen (1) for achieving colors by means of additional polarization filters (16, 18) in combination with the basic filter.

6. The method according to claim 4, characterized in  
utilizing a reflexive technique for the price and information display comprising the LCD screen (1) for achieving colors by means of additional polarization filters (16, 18) in combination with the basic filter.
7. The method according to claim 4, characterized in  
utilizing a transreflexive technique for the price and information display comprising the LCD screen (1) for achieving colors by means of additional polarization filters (16, 18) in combination with the basic filter.
8. A device for an electronic price and information display comprising a LCD screen (1), characterized in  
comprising a number of polarization filters (16, 18) forming a number of different combinations and a first polarization filter constituting a basic filter; and  
said basic filter being additionally combined with any of the other polarization filters by placing a second polarization filter (16, 18) of the other polarization filters on top of the basic filter to achieve a color of the background (10, 15) of the LCD screen and/or symbols (12a-12e, 13, 14a, 14b).
9. The device according to claim 8, characterized in  
that said second polarization filter (16, 18) is arranged to be rotated 90° in respect of said basic filter by means of a rotational device, thereby to change the color of the background (10, 15) of the LCD screen (1) and/or the symbols (12a-12e, 13, 14a, 14b).
10. The device according to claim 9, characterized in  
that said rotational device is a rotation means which may be controlled by a remote command.
11. The device according to claim 9, characterized in  
that said rotational device is a rotation means which may be controlled by a wireless command.

12. The device according to any of claims 8 to 11, characterized in

that the LCD screen (1) is utilizing a transmissive technique for achieving colors by means of any additional polarization filter (16, 18) in combination with the basic filter.

13. The device according to any of claims 8 to 11, characterized in

that the LCD screen (1) is utilizing a reflexive technique for achieving colors by means of any additional polarization filter (16, 18) in combination with the basic filter.

14. The device according to any of claims 8 to 11, characterized in

that the LCD screen (1) is utilizing a transreflexive technique for achieving colors by means of any additional polarization filter (16, 18) in combination with the basic filter.

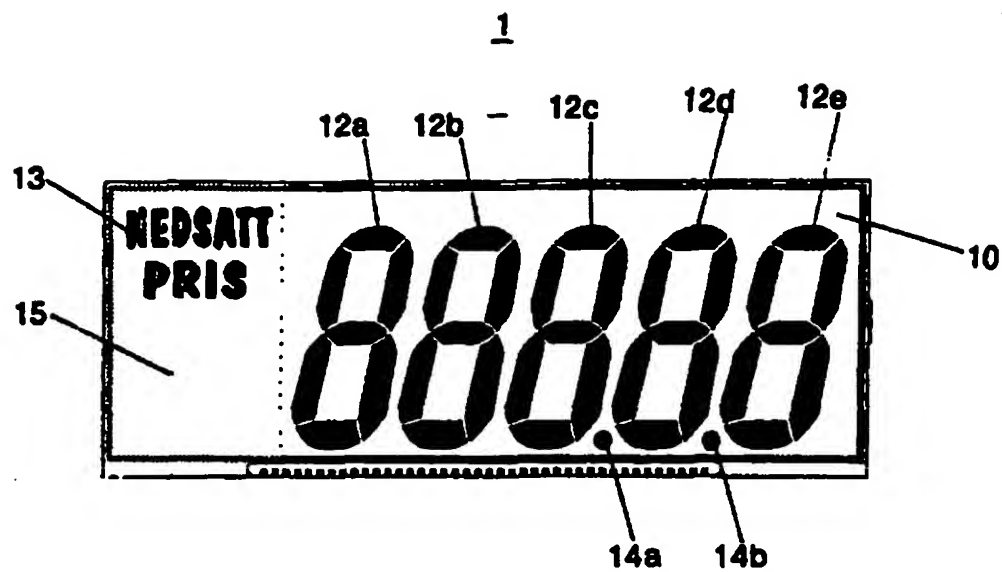


Fig. 1

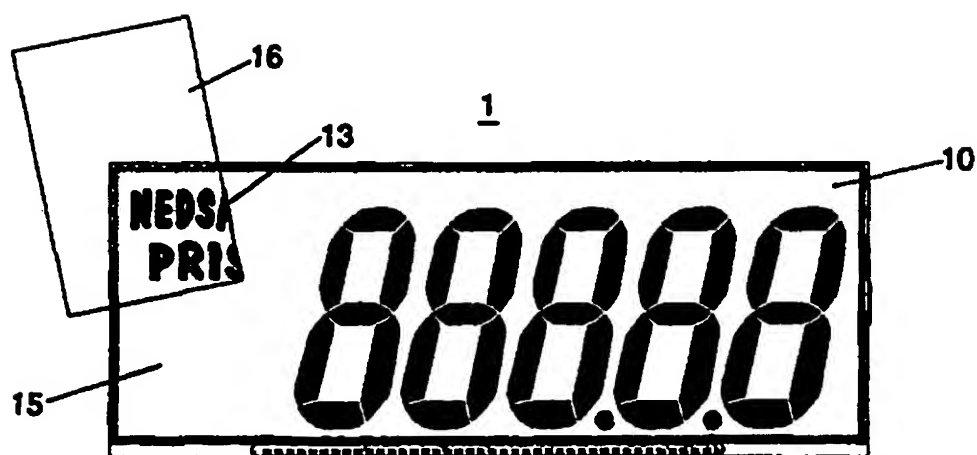


Fig. 2

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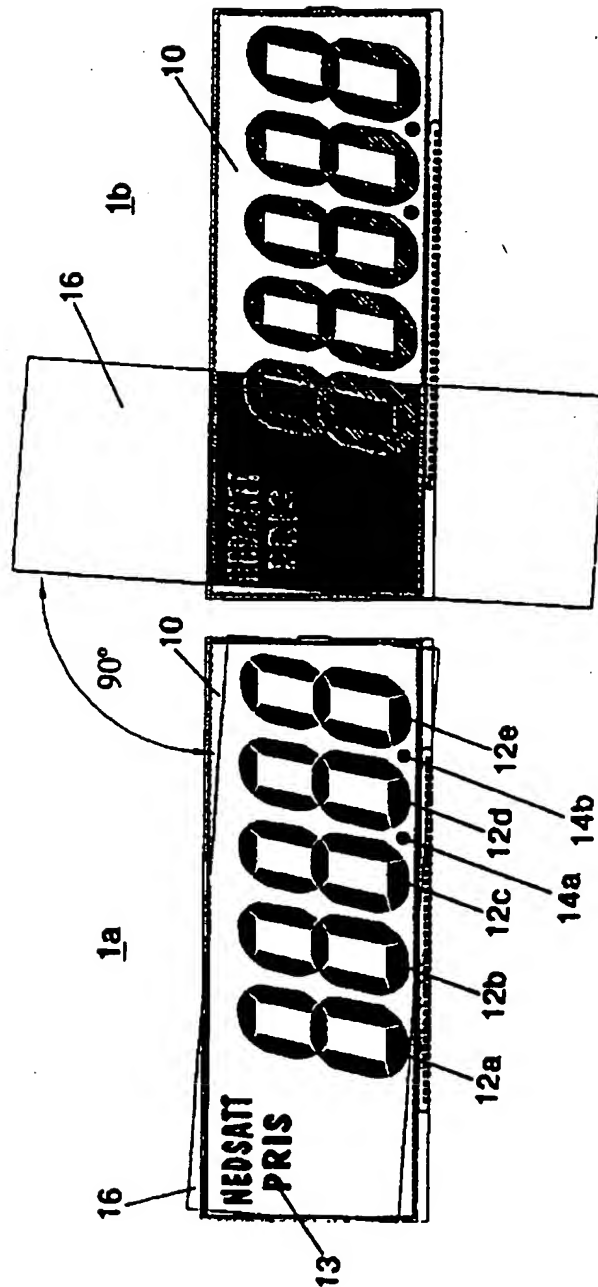


Fig. 3

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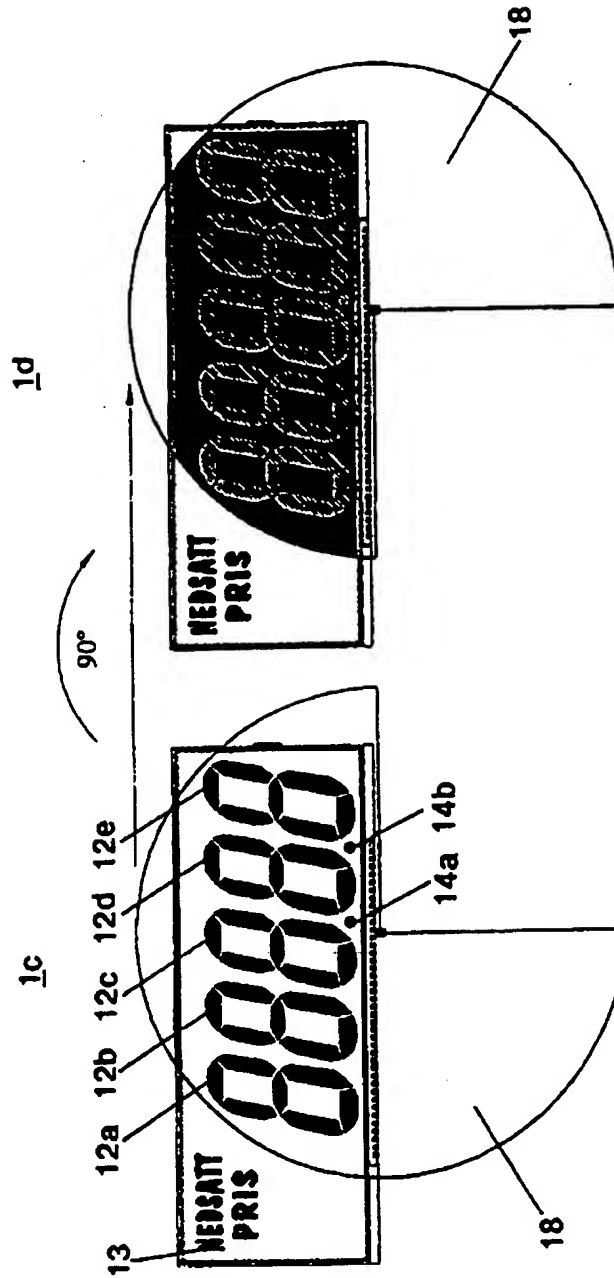


Fig- 4

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**A. CLASSIFICATION OF SUBJECT MATTER**

IPC6: G09F 9/35, G02F 1/1335

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**B. FIELDS SEARCHED**

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**WPI, CLAIMS****C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4877309 A (T. TAKAMATSU), 31 October 1989 (31.10.89), column 2, line 12 - line 55, abstract --	1-14
A	DE 3340468 A1 (ROBERT BOSCH GMBH), 15 May 1985 (15.05.85), page 2, line 30 - page 5, line 35, abstract --	1-14
A	US 4241339 A (Y. USHIYAMA), 23 December 1980 (23.12.80), column 2, line 55 - column 3, line 55, figure 1, abstract --	1-14

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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## INTERNATIONAL SEARCH REPORT

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 3943240 A1 (STRUCKEN, HEINRICH), 8 May 1991 (08.05.91), abstract  ----- --	1-14

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

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International application No.  
**PCT/SE 96/01727**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4877309 A	31/10/89	DE 3789855 D,T EP 0271315 A,B JP 63195624 A JP 7050279 B JP 63264731 A JP 1018129 A JP 7043477 B JP 1048034 A JP 7043478 B JP 63144326 A	08/09/94 15/06/88 12/08/88 31/05/95 01/11/88 20/01/89 15/05/95 22/02/89 15/05/95 16/06/88
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US 4241339 A	23/12/80	GB 1569516 A JP 53101296 A	18/06/80 04/09/78
DE 3943240 A1	08/05/91	NONE	

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